Charge and mass renormalization in no-photon QED

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Starting from a formal Hamiltonian as found in the physics literature - omitting photons - we define a renormalized Hamiltonian through charge and mass renormalization. We show that the restriction to the one-electron subspace is well-defined. Our construction is non-perturbative and does not use a cut-off.

The Hamiltonian is relevant for the description of the Lamb shift in muonic atoms.